

BUILDING ENERGY SIMULATION

*For Users of EnergyPlus, SPARK, DOE-2, BLAST, Genopt,
Building Design Advisor, ENERGY-10 and their Derivatives*

U s e r N e w s

What's New ?

.....EnergyPlus an Award(s) Winner!

The EnergyPlus team has won an award for excellence in technology transfer from the Federal Laboratory Consortium, an organization of more than 700 major federal laboratories, centers and their parent agencies.

EnergyPlus has also won the 2001 DOE Award for Information Technology. Get a free copy of EnergyPlus from <http://www.energyplus.gov>

.....Download VisualSPARK 1.0.1

Version 1.0.1 of VisualSPARK is available as a free download. Go to <http://SimulationResearch.lbl.gov> and click on VisualSPARK 1.0.1 in the left menu. User manuals are available as PDF files.

.....Model 1,000 Zones with DOE-2

DOE-2.1E, version 117, allows you to model up to 1,000 zones. It's offered at the same price as version 110. To order, email **Ed Kidd** at estsc@adonis.osti.gov

Also, the DOE-2.1E *BDL Summary* has been updated to reflect the new limits on zones and other components. Download Update #4 from our website. Details are on p. 4.

..... DOE-2 Resource Center in Poland

Victoria Polska, an energy management company with offices in Gdansk and Warsaw, is the newest DOE-2 Resource Center. **Tom Gibney**, Managing Director, is the primary contact.

Victoria Polska
ul. Wodarzewska 65e/2
02-384 Warszawa
Poland
Tel: (48) 22 824-0706
Fax: (48) 22 823-0146

.....IBPSA-USA Free Membership

The IBPSA-USA Board of Directors has waived the annual membership fee for 2002; see p. 14.

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SPARK is an equation-based simulation environment that allows you to build customized models of complex physical processes by connecting calculation objects that represent system components like walls, fans, heat exchangers, chillers, ducts, mixing boxes, controls, etc. It is aimed at the simulation of innovative and/or complex building systems that are beyond the scope of whole-building programs like DOE-2 and EnergyPlus. VisualSPARK adds a graphical user interface to SPARK to simplify use of the program.

VisualSPARK 1.0.1

VisualSPARK 1.0.1 is available free of charge from Lawrence Berkeley National Laboratory.

<http://SimulationResearch.lbl.gov> > VisualSPARK

The main elements of VisualSPARK are

- ◆ a user interface
- ◆ a network specification language
- ◆ graph-theoretic reduction methods to reduce the number of iteration variables
- ◆ a solver for solving simultaneous algebraic and differential equations
- ◆ a processor for graphically displaying results
- ◆ a model library of HVAC components and systems

With the network specification language you create equation-based calculation objects, and link the objects into networks that represent a building's envelope or HVAC components or systems. The solver solves this network for user-specified input parameters. With the results processor you graphically display the results of the calculation. Graph-theoretic reduction techniques automatically reduce the number of iteration variables, allowing VisualSPARK to obtain a solution of iteration variables, allowing VisualSPARK to obtain a solution 10 to 20 times faster than similar programs. VisualSPARK runs under the Windows 95/98/NT/2000, SunOS, Solaris and Linux operating systems.

Improvements to VisualSPARK 1.0.1

Graphical User Interface

- ◆ New examples have been added to the tutorial.
- ◆ Version number now appears in all window title bars.
- ◆ Balloon messages have been added to the Component Preference Editor.
- ◆ Layout of the Component Preference Editor has been changed to a more logical format with parts enabled only when they are allowable.
- ◆ Multiple trace files are now allowed, one for each trace type.
- ◆ Time units have been added to the X-axis title on graphs.
- ◆ Multiple units (e.g. "[W, deg C]") have been added to Y-axis titles on graphs.
- ◆ Graph lines are now thicker to improve visibility.
- ◆ On graph legends, curves that are mapped to the Y2 axis are grouped after curves mapped to the Y1 axis.
- ◆ Yellow curve color has been changed to gold for visibility.
- ◆ The run.log file now pops up, in addition to the error.log file, if there is a run-time problem while running the solver.

Documentation

- ◆ The separate Windows and Unix Installation and Usage Guides have been combined into a single document called the "VisualSPARK 1.0.1 Users Guide."
- ◆ The Users Guide now contains an extended tutorial that shows, step-by-step, how to set up a SPARK model of an air-conditioned room with a PI temperature controller.

Input Language Parser

- ◆ The LINK statement now creates a variable without specifying any connections.
- ◆ The PORT statement has a new keyword of the form LIKE=anotherPortName. This copies the properties (including the subports) of the port named 'anotherPortName', to the port currently being defined.

Setup Program

- ◆ The format of the problem.cpp file generated by setup has been modified to support the runtime loading scheme. See "Changes to Solver" for more details.

Solver

- ◆ A runtime loading scheme has been added to the solver in order to load the problem description contained in the problem.cpp file at runtime, during startup, as opposed to during the compilation step. This overcomes a compiler limitation that was encountered with large SPARK problems and also provides a faster way of loading problems during the problem testing phase. VisualSPARK can now be used to solve very large problems consisting of a thousand or more equations.
- ◆ The scaling scheme was modified to compute the weighted Euclidean norm of the residual function that is displayed to the cout stream in the detailed diagnostic mode.
- ◆ The scale is now the absolute value of the break variable instead of the arithmetic mean of the value of the break variable and of the value returned by the inverse associated with the break variable. Thus, the residual norm is no longer limited to a maximum value of 2. This new scaling scheme also improves the line-search backtracking step control. The time units of the Clock and DT links are now overridden with the corresponding unit strings specified in the problem run file. This allows the correct units to be displayed in the header portion of the output, trace and snapshot files.
- ◆ In the computation of the Secant method (based on the Broyden's update formula), fixed a bug that was returning a constant positive value for any negative partial derivative.
- ◆ Input files are now checked at runtime to make sure that the time stamps for the input values are specified in increasing order.
- ◆ The SPARK library functions defined in the file spark.h are now declared as part of the SPARK namespace (still in the same header file). This is to avoid potential name collision with user-defined functions in the atomic classes. The atomic classes defined in the globalclass directory and in the hvactk/class directory have been modified accordingly by adding namespace scope resolution before the function names.

If you would like to get an idea of what the program does before you download it, you can review the *SPARK Reference Manual* and the *VisualSPARK Users Guide*, both of which can be downloaded from the VisualSPARK site. To obtain a free copy of the program and/or review the documentation, go to

<http://SimulationResearch.lbl.gov> > VisualSPARK

Note that you do not have to already have VisualSPARK 1.0 to obtain VisualSPARK 1.0.1.

VisualSPARK was developed by the LBNL Simulation Research Group and Ayres Sowell Associates, with support from the U.S. Department of Energy, Drury Crawley, program manager



DOE-2



DOE-2.1E (version 117) 1,000-Zone version for Windows from ESTSC

Cost is as follows:

- \$ 300 U.S. Government, non-profit Educational
- \$ 575 U.S., Mexico, Canada
- \$ 1268 Japan only
- \$ 1075 All Other Foreign

DOE-2 Documentation on a CD from ESTSC - Cost US\$100

What is included on the CD?

- DOE-2 Reference Manual (Part 1)
- DOE-2 Reference Manual (Part 2)
- DOE-2 Supplement to the Reference Manual (2.1E)
- DOE-2 BDL Summary (2.1E)
- DOE-2 Engineers Manual (2.1A)

Order Software and ESTSC Documentation

Ed Kidd

NCI Information Systems, Inc.

Energy Science and Technology Software Center (ESTSC)

P.O. Box 1020

Oak Ridge, TN 37831

Phone: 865/576-1037

Fax: 865/576-6436

Email: estsc@adonis.osti.gov

Free DOE-2 Documentation (<http://SimulationResearch.lbl.gov> > DOE-2 > Documentation)

- DOE-2 Basics (2.1E)
- Update Package #1:
DOE-2.1E Basics, the Supplement and BDL Summary
- Update Package #2: (Version 107, DOE-2.1E)
BDL Summary and Supplement
- Update Package #3:
Appendix A of the Supplement
- Update Package #4: (1000-zone DOE-2.1E)
BDL Summary (pdf)

DOE-2 Basics and Update Packages 1, 2, 3 and 4, not included on the ESTSC CD, consist of scanned pdf files and may be downloaded from our web site. You may also request the same information on a CD by sending email to klrellington@lbl.gov.

The files need to be printed and the update pages inserted into the existing DOE-2 manuals.

Note that Update Packages are **not** cumulative and each one contains different information. You have to download all four packages to update the DOE-2 documentation completely.

DOE-2 Modeling Tips is a compilation of all the "how to" articles from the *Building Energy Simulation User News* (through 2001).

Purchase DOE-2 Documentation

DOE-2 Sample Run Book (2.1E) -- The *Sample Run Book* is the only remaining DOE-2 manual not available electronically. It must be purchased separately from NTIS; information is at <http://SimulationResearch.lbl.gov> > DOE-2 > Documentation



Update on the EnergyGauge® USA Program

by Danny Parker and the EnergyGauge Development Team

EnergyGauge USA, a product of the Florida Solar Energy Center (FSEC), is a user-friendly but highly sophisticated home energy simulation software tool. It uses DOE-2.1E to simulate energy use and provides for the combined evaluation of both the energy use and the economic and financial impacts of home energy-efficiency decision-making.

Danny Parker writes: we have successfully implemented hourly modeling of domestic solar water heating (SDHW) systems and rooftop and building integrated PV systems in Version 2.0 of EnergyGauge USA. The SDHW prediction is based on an hourly correlation to TRNSYS results which produces very similar values when implemented as a function within DOE-2. The hourly PV system performance is estimated using PVFORM with electrical loads passed from DOE-2. The PV modeling with power production matched against aggregate HVAC and end-use appliance loads is a new and very powerful capability of the software.

Following are abstracts from two FSEC technical papers that explore EnergyGauge. For complete information, please visit www.energygauge.com.

Validation of EnergyGauge® USA Using the HERS BESTEST Procedure

by P. Fahey, R. K. Vieira and D. S. Parker

Abstract: This report presents results from the testing and validation of the EnergyGauge USA home energy rating software conducted using the HERS BESTEST procedures. The results show that EnergyGauge USA is an excellent and verifiable simulation program that is capable of meeting all national requirements for home energy rating software tools.

www.fsec.ucf.edu/%7Ebdac/pubs/bestest/rr55.htm

Evaluation of EnergyGauge® USA, A Residential Energy Design Software Program, Against Monitored Data

by B. S. Fuehrlein, S. Chandra, D. Beal, D. S. Parker and R. K. Vieira

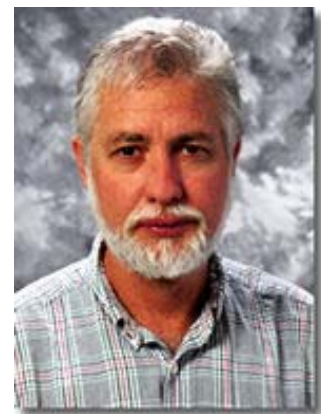
Abstract: A new software program, EnergyGauge® USA, has been developed for the calculation of energy use in residential buildings. A simplified user interface allows buildings to be quickly defined and evaluated. Utilization of the DOE-2.1E energy simulation engine brings the computing power of hourly simulation to designers and raters.

www.fsec.ucf.edu/%7Ebdac/pubs/valid/pf357.htm

Home Depot Stocks New Ceiling Fan Invented by FSEC's Danny Parker

A ceiling fan, invented by FSEC researcher Danny Parker, and produced and marketed under the name Gossamer Wind Series, went on sale at Home Depot stores across the nation in 2001. The innovative blade design is 40 percent more energy efficient than a conventional ceiling fan. Parker fashioned the blades after an airplane propeller. The twisted and tapered airfoil blades are designed to cut effortlessly through the air, reducing the amount of turbulence and lost energy produced by conventional ceiling fans. The improved ceiling fan blades were developed in cooperation with AeroVironment Inc. of Monrovia, CA, which specializes in advanced aeronautical design for NASA.

For more information, go to <http://www.fsec.ucf.edu/About/WhatsNew.htm>



FSEC researcher Danny Parker

Recent Reports

These reports are available from
Pat Ross. Please fax your request to (510) 486-4089
or send email to PLRoss@lbl.gov with LBNL number and title.

LBNL-45949

Model-Based Performance Monitoring: Review of Diagnostic Methods and Chiller Case Study

P. Haves and S. K. Khalsa
Building Technologies Department
Lawrence Berkeley National Laboratory

Abstract:

The paper reviews the variety of technical approaches to the problem of detecting and diagnosing faulty operation in order to improve the actual performance of buildings. The review covers manual and automated methods, active testing and passive monitoring, the different classes of models used in fault detection, and methods of diagnosis. The process of model-based fault detection is then illustrated by describing the use of relatively simple empirical models of chiller energy performance to monitor equipment degradation and control problems. The CoolTools™ (www.hvacexchange.com/cooltools/) chiller model identification package is used to fit the DOE-2 chiller model to on-site measurements from a building instrumented with high quality sensors. The need for simple algorithms to reject transient data, detect power surges and identify control problems is discussed, as is the use of energy balance checks to detect sensor problems. The accuracy with which the chiller model can be expected to predict performance is assessed. A case study is described in which the model was applied retroactively to high-quality data collected in a San Francisco office building as part of a related project.

LBNL-48629

Comparative Guide to Emerging Diagnostic Tools for Large Commercial HVAC Systems

H. Friedman and M. A. Piette
Building Technologies Department
Lawrence Berkeley National Laboratory

Abstract:

This guide compares emerging diagnostic software tools that aid detection and diagnosis of operational problems for large HVAC systems. We have evaluated six tools for use with energy management control system (EMCS) or other monitoring data. The diagnostic tools summarize relevant performance metrics, display plots for manual analysis, and perform automated diagnostic procedures. Our comparative analysis presents nine summary tables with supporting explanatory text and includes sample diagnostic screens for each tool.

LBNL-45548

An Expandable Software Model for Collaborative Decision-Making During the Whole Building Life Cycle

K. Papamichael, V. Pal, N. Bourassa,
J. Loffeld and G. Capeluto
Building Technologies Department
Lawrence Berkeley National Laboratory

Abstract:

Decisions throughout the life cycle of a building, from design through construction and commissioning to operation and demolition, require the involvement of multiple interested parties. The performance of alternative designs and courses of action must be assessed with respect to multiple performance criteria, such as comfort, aesthetics, energy, cost and environmental impact. Several stand-alone computer tools are currently available that address specific performance issues during various stages of a building's life cycle. Some of these tools support collaboration by providing means for synchronous and asynchronous communications, performance simulations, and monitoring of a variety of performance parameters involved in decisions about a building during building operation. However, these tools are not linked in any way, so significant work is required to maintain and distribute information to all parties. In this paper we describe a software model that provides the data management and process control required for collaborative decision making throughout a building's life cycle. The requirements for the model are delineated addressing data and process needs for decision making at different stages of a building's life cycle. The software model meets these requirements and allows addition of any number of processes and support databases over time. What makes the model infinitely expandable is that it is a very generic conceptualization (or abstraction) of processes as relations among data. The software model (1) supports multiple concurrent users, and facilitates discussion and debate leading to decision making, (2) allows users to define rules and functions for automating tasks and alerting all participants to issues that need attention, (3) supports management of simulated and real data and (4) continuously generates information useful for improving performance prediction and understanding of the effects of proposed technologies and strategies.

Recent Reports

These reports are available from
Pat Ross. Please fax your request to (510) 486-4089
or send email to PLRoss@lbl.gov with LBNL number and title.

LBNL-47948

Integrating Advanced Facades into High Performance Buildings

Stephen E. Selkowitz,
Building Technologies Department
Lawrence Berkeley National Laboratory

Abstract:

Glass is a remarkable material but its functionality is significantly enhanced when it is processed or altered to provide added intrinsic capabilities. The overall performance of glass elements in a building can be further enhanced when they are designed to be part of a complete façade system and the façade system delivers the greatest when it becomes an essential element of a fully integrated building design. This presentation examines the growing interest in incorporating advanced glazing elements into more comprehensive façade and building systems in a manner that increases comfort, productivity and amenity for occupants, reduces operating costs for building owners, and contributes to improving the health of the planet by reducing overall energy use and environmental impacts.

LBNL-44422

U-Values of Flat and Domed Skylights

J. H. Klems
Building Technologies Department
Lawrence Berkeley National Laboratory

Abstract:

Data from nighttime measurements of the net heat flow through several types of skylights is presented. A well-known thermal test facility was reconfigured to measure the net heat flow through the bottom of a skylight/light well combination. Use of this data to determine the U-factor of the skylight is considerably more complicated than the analogous problem of a vertical fenestration contained in a test mask. Correction of the data for heat flow through the skylight well surfaces and evidence for the nature of the heat transfer between the skylight and the bottom of the well is discussed. The resulting measured U-values are presented and compared with calculations using the WINDOW 4 and THERM programs.

LBNL-47544

Simulating the Operation of Photosensor-Based Lighting Controls

C. Erlich, K. Papamichael, J. Lai and K. Revsan
Building Technologies Department
Lawrence Berkeley National Laboratory

Abstract:

Energy savings from the use of daylighting in commercial buildings are realized through implementation of photoelectric lighting controls that dim electric lights when sufficient daylight is available to provide adequate workplace illumination. The dimming level of electric lighting is based on the signal of a photosensor. This paper presents a method that simulates the performance of photosensor controls considering the acceptance angle, angular sensitivity, placement of the photosensor within a space, and color correction filter.



LBNL-49018

A Method for Simulating the Performance of Photosensor-Based Lighting Controls

C. Erlich, K. Papamichael, J. Lai and K. Revsan
Building Technologies Department
Lawrence Berkeley National Laboratory

Abstract:

The unreliability of photosensor-based lighting controls continues to be a significant market barrier that prevents widespread acceptance of daylight dimming controls in commercial buildings. Energy savings from the use of daylighting in commercial buildings is best realized through the installation of reliable photoelectric lighting controls that dim electric lights when sufficient daylight is available to provide adequate background and/or task illumination.



Newsletter Roundup

Newsletters are a great way to keep up to date on news within the building energy efficiency community. Here is our "short list" of the best.

Advanced Buildings

<http://greenbuilding.ca/GBIC.htm>

Newsletter of the Royal Architectural Institute of Canada. Building simulation activities in Canada..

CADDET

<http://www.caddet.co.uk/>

IEA's international newsletter on energy efficiency. Practical and innovative articles by international energy researchers and practitioners.

e-EFFICIENCY NEWS

<http://www.ase.org/about/about.htm>

The bi-monthly electronic newsletter from the Alliance to Save Energy.

Energy User News

<http://www.energyusernews.com>

Trade publication covers energy efficiency in new and existing non-residential buildings.

EREN News

<http://www.eren.doe.gov/newsletter/archive.html>

Energy Efficiency and Renewable Energy Network of the U.S. Department of Energy. EREN Network News is a weekly electronic newsletter covering energy efficiency and renewable energy news.

Green Energy News

<http://www.nrglink.com/index.html>

Weekly online publication offers news about energy efficiency and related "green" energy issues for non-residential facilities, etc.

IAEEL Newsletter

<http://www.iaeel.org>

International Association for Energy-Efficient Lighting. Lighting research and discussions of lighting energy efficiency and safety issues.

IBPSA News

<http://www.mae.okstate.edu/ibpsa/newslett.htm>

Newsletter of the International Building Performance Simulation Association (IBPSA). Technical articles about innovative building simulation techniques.

Lighting Design Lab

<http://www.northwestlighting.com/ldl>

Lighting lab activities in the Pacific Northwest. Lots of workshops and classes listed.

Lighting Futures

<http://www.lrc.rpi.edu/Futures/index.html>

Articles on emerging lighting technologies. Great resource list of lighting web sites and contacts.

Setting the Standard

<http://www.energycodes.gov/news/>

Newsletter of the U.S. Department of Energy's Building Standards and Guidelines Program.

WINDOW 5.0 is a publicly available computer program used for calculating total window thermal performance indices (i.e., U-values, solar heat gain coefficients, shading coefficients, and visible transmittances). WINDOW 5.0 provides a versatile heat transfer analysis method consistent with the updated rating procedure developed by the National Fenestration Rating Council (NFRC) that is consistent with the ISO 15099 standard. The program can be used for the design and development of new products, to assist educators in teaching heat transfer through windows, and to develop building energy codes.

WINDOW 5.0 is a significant upgrade to the LBNL WINDOW 4.1 program; it includes all of the WINDOW 4.1 capabilities as well as these enhancements:

- A state of the art Microsoft Windows™ interface
- Updated algorithms for the calculation of total fenestration product U-values and Solar Heat Gain Coefficient consistent with ASHRAE SPC142, ISO15099, and the National Fenestration Rating Council
- A Condensation Resistance Index in accordance with the NFRC 500 Standard
- A surface temperature map
- An integrated database of properties
- Output of a window data file for use in EnergyPlus ver. 1.0.1 and later
- links to other LBNL window analysis software:
 - THERM 5 for calculating 2-D frame and edge effects
 - RESFEN for calculating the energy effects of windows in typical houses throughout the United States
 - Optics5 for the optical properties of all coated and uncoated glazings, laminates, and applied films.

http://windows.lbl.gov/software/window/window_getacopy.asp

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You are invited to test **DoeRayMe**, a new DOE-2.1E screening tool application currently being developed by Jason Glazer, P. E., of GARD Analytics, Inc. **DoeRayMe** is a simple and flexible interface that uses a specially developed DOE-2 input file (template) that contains special codes describing the parameters available to be changed in the user interface. This allows new screening tools to be developed by any DOE-2 user. Please visit the **DoeRayMe** web site at <http://www.gard.com/DoeRayMe>.



DOE-2 Training

Private or group DOE-2 courses for beginning and advanced users:
Contact Marlin Addison at (602) 968-2040, or send email to marlin.addison@doe2.com

GenOpt 1.1

Generic Optimization Program

New in *GenOpt* 1.1 are an additional algorithm for multi-dimensional optimization, algorithms for one-dimensional optimization, and an algorithm for parametric runs in a multi-dimensional space. The new version allows processing of multiple function values and has an improved graphical user interface.

GenOpt is a multi-parameter optimization program, available free of charge from LBNL. It automatically finds the values of user-selected design parameters that minimize a **cost function**, such as annual energy use, calculated by an external simulation program like EnergyPlus, SPARK, DOE-2, BLAST, TRACE, TRNSYS, etc. *GenOpt* can be used with any simulation program that has text-based input and output. It also offers an interface for adding custom optimization algorithms to its library.

GenOpt 1.1 (with user manual) may be downloaded free of charge from

<http://SimulationResearch.lbl.gov> > GenOpt

Join the BLDG-SIM Mail ing List

BLDG-SIM is a mailing list for users of building energy simulation programs like EnergyPlus, DOE-2, Trace-600, HAP, BLAST, ESP, SERIRES, TRNSYS, TASE, ENERGY-10 and others.

Because building simulation professionals are located worldwide, the BLDG-SIM list is an attempt to foster the development of a community of those users. Users of all levels of expertise are welcome and are encouraged to share their questions and insights about these programs.

The web page for BLDG-SIM is <http://www.gard.com/bldg-sim.htm>

Jason Glazer, P.E., Of GARD Analytics, Inc. Is the list administrator (jglazer@gard.com).



The Building Energy Simulation User News is published bi-monthly and distributed electronically by the Simulation Research Group at Lawrence Berkeley National Laboratory, with cooperation from the Building Systems Laboratory at the University of Illinois. Direct comments or submissions to Kathy Ellington (KLEllington@lbl.gov). Direct BLAST-related inquiries to the Building Systems Laboratory (support@blast.bso.uiuc.edu).

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Lights ...!! Camera ...!! HVAC ??



As we first reported last year, the Consumer Energy Center of the California Energy Commission started an ambitious project to create training videos for building energy professionals. They now offer videos about structural insulated panels, fenestration, fiberglass/cellulose/spray foam insulation, HVAC, cool roofs and both radiant and (house wrap) air barriers. The videos take the form of informal conversations between building professionals, who demystify and discuss the subject. Even though their emphasis is on residential and small buildings, the web site is worth exploring, go to:

<http://www.consumerenergycenter.org/videos/>

ENERGY-10, Version 1.3 with WeatherMaker

Version 1.3 of ENERGY-10 is now available. It includes the much-anticipated **WeatherMaker** function. *WeatherMaker* allows users to create their own weather files based on information available from nearly 4,000 weather stations throughout the U.S. Revisions to the program itself include some minor fixes, an improved and expanded Help section, and greater clarity in titling and identification of various sections. Contact the Sustainable Buildings Industries Council for more information, or to order your upgrade disc (the cost is \$15, which covers production and shipping).

ENERGY-10, written in C++, is a design tool for smaller residential or commercial buildings that are less than 10,000 ft² floor area, or buildings that can be treated as one- or two-zone increments. It performs whole-building energy analysis for 8760 hours/year, including dynamic thermal and daylighting calculations. ENERGY-10 was specifically designed to facilitate the evaluation of energy-efficient building features in the very early stages of the design process.

Input: Only four inputs required to generate two initial generic building descriptions. Virtually everything is defaulted but modifiable. As the design evolves, the user adjusts descriptions using fill-in menus (utility-rate schedules, construction details, materials).

Output: Summary table and 20 graphical outputs available, generally comparing current design with base case. Detailed tabular results also available.

Platform: PC-compatible, Windows 3.1/95/98, Pentium processor with 16 MB of RAM is recommended.

Douglas K. Schroeder
1331 H Street N.W., #1000
Washington, DC 20004



Tel: 202.628.7400 ext 210
Fax: 202.383.5043
www.sbicouncil.org

Sustainable Buildings Industry Council (SBIC)

SBIC Workshops

- April 18-19, 2002 Low-Energy, Sustainable Building Design for Federal Managers (Golden, CO)
- April 24-25, 2002 High Performance Schools (Indianapolis, IN)
- May 8, 2002 Designing Low-Energy Buildings with ENERGY-10 (Charlotte, NC)
- April 18-19, 2002 Low-Energy, Sustainable Building Design for Federal Managers (Golden, CO)

ENERGY-10 User Group at <http://www.sbicouncil.org/forum>

SBIC Bookstore at <http://www.sbicouncil.org/store/resources.php#pubs>

- ✓ *High Performance School Buildings Resource & Strategy Guide*
- ✓ *Low-Energy Sustainable Building Design for Federal Managers*
- ✓ *Designing Low-Energy Buildings With ENERGY-10*
- ✓ *Guidelines for Home Building*
- ✓ *Mastering ENERGY-10*

Building Design Advisor 2.0

*Decision making through the
integrated use of multiple
simulation tools and databases*

The **Building Design Advisor (BDA)** is a Windows® program that addresses the needs of building decision-makers from the initial, schematic phases of building design through the detailed specification of building components and systems. The BDA is built around an object-oriented representation of the building and its context, which is mapped onto the corresponding representations of multiple tools and databases. It then acts as a **data manager** and **process controller**, automatically preparing input to simulation tools and integrating their output in ways that support multi-criterion decision-making. Version 3.0 of the BDA is now available for Beta testing and includes links to three main simulation tools for daylighting, electric lighting and energy analyses:

- **DCM**, a simplified daylighting simulation tool,
- **ECM**, a simplified electric lighting simulation tool, and
- the **DOE-2.1E** building energy simulation program.

ECM, the **new electric lighting simulation tool** in BDA 3.0 beta, is integrated through BDA with DOE-2. BDA's Schematic Graphic Editor allows placement of electric lighting luminaires and specification of reference points for daylight-based electric lighting controls. Moreover, BDA now has the capability of **running DOE-2 parametrically** to generate a plot that shows the relationship between effective aperture and energy requirements. BDA 3.0 beta provides the added functionality of working with either **English units or Metric units**.

Current research and development efforts are focused on the development of links to **Desktop Radiance**, a Windows 95/98/NT version of the **Radiance** lighting/daylighting simulation and rendering software.

The minimum and recommended system **requirements** to run the BDA software are as follows:

Minimum

Pentium 75
Windows 95, 98, NT 4.0.
16 / 32MB RAM under Windows 95
30 MB of larger hard disk space.
640x480 or higher screen resolution.

Recommended

Pentium 200 or better.
Windows 95, 98, NT 4.0.
24 / 64MB RAM under Windows NT 4.0.
60 MB of larger hard disk space.
1024x768 or higher screen resolution.

The BDA source code is available for licensing; if interested, please contact Dr. Papamichael at K_Papamichael@lbl.gov. To learn more about the BDA software and to download a copy of the latest public version (BDA 2.0), go to <http://gaia.lbl.gov/BDA>

For Beta Testing of BDA 3.0, contact Vineeta Pal at VPal@lbl.gov.



Knowledge helps you make a living, Wisdom helps you make a life.

The Lowdown on Downloads from Lawrence Berkeley National Laboratory

Free Downloads

BDA 2.0 (Building Design Advisor) A beta version of 3.0 is also available from vpal@lbl.gov	gaia.lbl.gov/BDA
COMIS (multi-zone air flow and contaminant transport model)	www-epb.lbl.gov/comis
EnergyPlus 1.0 (new-generation whole-building energy analysis program, based on BLAST and DOE-2)	www.energyplus.gov --or-- SimulationResearch.lbl.gov > EnergyPlus
GenOpt[®] 1.1 (generic optimization program)	SimulationResearch.lbl.gov > GenOpt
RADIANCE (analysis and visualization of lighting in design) Desktop Radiance (integrates the Radiance Synthetic Imaging System with AutoCAD Release 14)	radsite.lbl.gov/radiance/ radsite.lbl.gov/deskrad/
RESEM (Retrofit Energy Savings Estimation Model) (calculates long-term energy savings directly from actual utility data)	eetd.lbl.gov/btp/resem.htm
SUPERLITE (calculates illuminance distribution for room geometries)	eetd.lbl.gov/btp/superlite2.html
THERM 2.1a (model two-dimensional heat-transfer effects in building components where thermal bridges are of concern)	windows.lbl.gov/software/therm/therm.html
VisualSPARK 1.0.1 (Simulation Problem Analysis and Research Kernel) (connect component models to simulate innovative building envelope and HVAC systems)	SimulationResearch.lbl.gov > VisualSPARK
WINDOW 5 (thermal analysis of window products)	windows.lbl.gov/software/window/window.html

Free Software / Request by Fax from 510.486.4089

RESFEN 3.1 (choose energy-efficient, cost-effective windows for a given residential application)	windows.lbl.gov/software/resfen/resfen.html
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Web Based

Home Energy Saver (quickly compute home energy use) and Home Improvement Tool (simplified Home Energy Saver)	hes.lbl.gov and hit.lbl.gov
---	---

Purchase

ADELIN 2.0 (daylighting performance in complex spaces)	radsite.lbl.gov/adeline/
--	--

DOE-2 Help Desk

Email, phone or fax the Simulation Research Group with your questions (klrellington@lbl.gov).
Phone: (510) 486-5711, Fax: (510) 486-4089

BLASTnews

www.bso.uiuc.edu

Building Systems Laboratory, 30 Mech Eng Bldg.
University of Illinois, 1206 West Green Street
Urbana, IL 61801

Tel: (217) 333-3977 - Fax: (217) 244-6534
support@blast.bso.uiuc.edu

The **Building Loads Analysis and System Thermodynamics (BLAST)** program predicts energy consumption, energy system performance and cost for new or existing (pre-retrofit) buildings.

BLAST contains three major sub-programs:

- **Space Load Prediction** computes hourly space loads in a building based on weather data and user inputs detailing the building construction and operation.
- **Air Distribution System Simulation** uses the computed space loads, weather data, and user inputs.
- **Central Plant Simulation** computes monthly and annual fuel and electrical power consumption.

Heat Balance Loads Calculator (HBLC)

The BLAST graphical interface (HBLC) is a Windows-based interactive program for producing

BLAST input files. You can download a demo version of HBLC (for MS Windows) from the BLAST web site (User manual included).

HBLC/BLAST Training Courses

Experience with the HBLC and the BLAST family of programs has shown that new users can benefit from a session of structured training with the software. The Building Systems Laboratory offers such training courses on an as needed basis typically at our offices in Urbana, Illinois.

WINLCCID 98

LCCID (Life Cycle Cost in Design) was developed to perform Life Cycle Cost Analyses (LCCA) for the Department of Defense and their contractors.

To order BLAST-related products, contact the Building Systems Laboratory at the address above.

Program Name	Order Number	Price
PC BLAST Includes: BLAST, HBLC, BTEXT, WIFE, CHILLER, Report Writer, Report Writer File Generator, Comfort Report program, Weather File Reporting Program, Control Profile Macros for Lotus or Symphony, and the Design Week Program. The package is on a single CD-ROM and includes soft copies of the BLAST Manual, 65 technical articles and theses related to BLAST, nearly 400 processed weather files with a browsing engine, and complete source code for BLAST, HBLC, etc. Requires an IBM PC 486/Pentium II or compatible running MS Windows 95/98/NT.	3B486E3-0898	\$1500
PC BLAST Package Upgrade from level 295+	4B486E3-0898	\$450
WINLCCID 98: executable version for 386/486/Pentium	3LCC3-0898	\$295
WINLCCID 98: update from WINLCCID 97	4LCC3-0898	\$195

The last four digits of the catalog number indicate the month and year the item was released or published. This will enable you to see if you have the most recent version. All software will be shipped on 3.5" high density floppy disks unless noted otherwise.

FREE Membership in 2002!!!

International Building Performance Simulation Association USA Affiliate

The IBPSA-USA Board of Directors has waived the annual membership fee for 2002 so joining our organization is easier than ever. If you want to become a member, send an email with your name, company, mailing and email address, and phone and fax numbers to Rick Strand (r-strand@uiuc.edu). You will receive a confirmation email to indicate that you have been accepted for membership. For more information on IBPSA or IBPSA-USA. We'll see you at the next IBPSA meeting -- 4 PM on Saturday, June 22, 2002 in Honolulu.

<http://www.ibpsa.org>



PG&E Spring 2002 Programs



To register call 415.973.7268 or go to www.pge.com/pec

HVAC

- | | |
|-----------------|--|
| April 10 | Designing Underfloor Air Systems -- Issues and design strategies for HVAC systems using underfloor air distribution. |
| <hr/> | |
| April 24 | Capturing Motor Efficiency Opportunities - Identify and analyze energy conservation opportunities involving their motors and driven equipment. Participants will learn how to use the MotorMaster+ software to adopt motor specifications and design purchase policies, to identify and replace problem motors, to design cost-effective "repair versus replace" practices, to appropriately deal with oversized and underloaded motors, and to know when to immediately replace an operable motor. |

WHOLE-BUILDING PERFORMANCE

- | | |
|-----------------|--|
| April 18 | Building Energy Audits - An overview of energy auditing techniques, tools, and software including building benchmarking, billing data analysis, identifying energy conservation opportunities, and cost and payback calculations, and the use of monitoring equipment through a series of hands-on exercises. |
| <hr/> | |
| April 25 | Data Collection for Packaged Units – Energy-saving opportunities available for maintaining or retrofitting packaged HVAC units; specifically economizer performance, compressor cycling, evaporative cooling, and the manufacturer's efficiency rating. |

ARCHITECTURE








- | | |
|-----------------------------------|--|
| April 2
April 30 | Integrated Building Design - Discover how design decisions related to external shading, building envelope, glazing, HVAC systems, electric lighting and daylighting can be integrated to create comfortable and energy-efficient indoor environments. |
| <hr/> | |
| April 11
May 3 | Daylighting Fundamentals - Fundamental principles of daylighting design used to achieve high-quality lighting, lively building interiors, and energy savings. |

LIGHTING

- | | |
|-----------------|---|
| April 2 | Lighting Design for Architects - Lighting concepts for architects, including terminology, visual perception, surface properties, light and color theory, equipment, design criteria, and applied design. |
| <hr/> | |
| April 23 | Lighting Fundamentals - Lighting designer Tom Tolen will use the Energy Center's lighting classroom to demonstrate basic concepts, terminology, light and color theory, electric light sources, luminaire design, controls, calculations, and economics. |

Meetings, Conferences, Symposia

2002



March 24-26 2002	The National Green Building Conference	To be held in Seattle, WA http://www.nahbrc.org/	
March 25-26 2002	ACEEE Symposium on Market Transformation	To be held in Washington, DC http://www.aceee.org/conf/mt02annc.htm	
April 14-18 2002	LIGHT + BUILDING International Trade Fair	To be held in Frankfurt, Germany email ina.wiesberger@messefrankfurt.com	
April 29- May 3 2002	2002 Worldwide Energy Conference	To be held in Washington, DC http://www.desc.dla.mil/DCM/DCMPage.asp?LinkID=DESCWWEC2002Home	
May 8-10 2002	10 th National Conference on Building Commissioning	To be held in Chicago, IL http://www.peci.org/ncbc/2002/index.html	
May 20-23 2002	13 th Symposium on Improving Building Systems in Hot and Humid Climates	To be held in Houston, TX http://www-esl.tamu.edu/hh/main.htm	
June 2-5 2002	Energy 2002 Energy Efficiency Workshop & Exposition	To be held in Palm Springs, CA Contact: joanne@fsec.ucf.edu	
June 3-5 2002	16th European Simulation Multi-Conference	To be held in Darmstadt, germany http://biomath.rug.ac.be/~scs/conf/esm2002/index.html	
June 22-26 2002	ASHRAE Annual Meeting	To be held in Honolulu, HI Contact: jyoung@ashrae.org http://www.ashrae.org	 

Meetings, Conferences, Symposia (continued)

2002 Continued

June 30-July 5 2002	Indoor Air 2002		To be held in Monterey, CA http://www.indoorair2002.org
July 15-18 2002	2002 National Workshop on State Energy Building Codes		To be held in Des Moines, IA -- http://www.eren.doe.gov/buildings/codes_standards/buildings/2002_workshop.html
August 18-23 2002	 Teaming for Efficiency		To be held in Pacific Grove, CA http://www.aceee.org
September 12-13 2002	eSim 2002 Canadian Conference on Building Energy Simulation		To be held in Montreal, Canada http://buildingsgroup.nrcan.gc.ca/esim2002/English/esim_home.htm
December 4-6 2002	Advances in Building Technology		To be held in Hong Kong Contact: clyystui@polyu.edu.hk http://www.polyu.edu.hk/~fclu/ABT21002
December 16-18 2002	6 th International Conference on System Simulation in Buildings		To be held in Liege, Belgium Contact: michele.deprez@ulg.ac.be http://www.ulg.ac.be/labothap

2003

January 25-29 2003	ASHRAE Winter Meeting		To be held in Chicago, IL Contact: jyoung@ashrae.org http://www.ashrae.org
June 28-July 2 2003	ASHRAE Annual Meeting		To be held in Kansas City, MO Contact: jyoung@ashrae.org http://www.ashrae.org

DOE-2 Directory of Program Related Software and Services

ESTSC Versions of DOE-2

Program Name	Description	Cost
DOE-2.1E (Ed Kidd or Walt Kelly) estsc@adonis.osti.gov ESTSC P.O. Box 1020 Oak Ridge, TN 37831-1020 Ph: 865-576-2606 / Fx: 576-2865 www.osti.gov/estsc	Source code, executable code and complete current documentation for: DOE-2.1E, Version 117 (1,000-zone version) Operating System: Windows	Support From ESTSC, limited operational support (telephone assistance concerning installation, media or platform questions). Windows U. S. Govt, Educational \$300 US, Mexico, Canada \$575 Japan \$1268 Other Foreign \$1075

Commercial Versions of DOE-2

Program Name	Description	Cost
ADM-DOE-2 (Richard Burkhardt) ADM Associates 3239 Ramos Circle Sacramento, CA 95827-2501 Ph: 916-363-8383, Fx: 363-1788 www.adm-energy.com	Use on 386/486 PCs with a math co-processor and 4MB of RAM. The package contains everything needed to run the program: program files, utilities, sample input files, and weather files. More than 300 weather files available. Operating System: DOS, Windows 95	Input Output Support \$395 + \$15/SH including one set weather data (your choice) and documentation
Compare-IT (Matt Brost) RLW Analytics, Inc. info@rlw.com 1055 Broadway, Suite G Sonoma, CA 95476 Ph: 707-939-8823, Fx: 939-9218 www.rlw.com	Compare-IT allows DOE-2 professionals to add value to their projects by giving clients "what-if" scenarios using DOE-2. The interface is designed for novice energy analysts and the GUI can be customized for each client's particular interests. Based DOE-2.1E. Operating System: DOS, Windows (98, 95, NT)	Input: Customizable windows GUI dynamically built based on DOE-2 macros. Output Support \$500 consultant \$2000 client Documentation available
DOE-Plus (Steve Byrne) Item Systems byrne @ item.com 321 High School Road NE Box 344 Bainbridge Island, WA 98110 Ph: 206-855-9540 / Fx: 855-9541 http://www.item.com/doeplus.htm	Complete support for all DOE-2 commands. Utility programs included: Prep, Demand Analyzer, weather processor. Over 500 worldwide weather files. Imports BDL files created with a text editor or other program. Based on DOE-2.1E. Operating System: DOS, Windows (3.1, 95, NT)	Input Interactive, graphical, fill-in-the-blanks Output Customizable tables and graphics \$895 with DOE-2 and doc \$495 without DOE-2 Source code not available.

Note: We list third-party DOE-2-related products and services for the convenience of program users, with the understanding that the Simulation Research Group does not have the resources to check the DOE-2 program adaptations and utilities for accuracy or reliability.

Commercial Versions of DOE-2 (continued)

Program Name	Description		Cost
EnergyPro 3.0 (D. Vonderkullen) demian@energysoft.com Gabel Dodd/EnergySoft LLC 100 Galli Drive #1 Novato, CA 94949-5657 Ph: 415-883-5900, Fx: 883-5970 www.energysoft.com	Performs nonresidential load calculations for HVAC equipment sizing. Electronically exports forms to AutoCad for inclusion on blueprints. On-line help. 344 weather files for the U.S. and Canada. Operating System: DOS, Windows (95, NT). For California Users: Performs Title 24 compliance calculations, includes state-certified HVAC and DHW Equipment directories, Title 24 tailored lighting calculations. Based on ESTSC DOE-2.1E	<u>Input:</u> Graphical <u>Output:</u> Graphs, forms <u>Support:</u> Unlimited support	DOE-2 Module: Non-residential \$ 700 ^{1,2} Residential \$ 250 ^{1,2} Program Interface \$ 195 ³ ¹ price reflects cash discount ² includes documentation ³ required
EZDOE (Bill Smith) bsmith @ elitesoft.com Elite Software P.O. Box 1194 Bryan, TX 77806 Ph: 409-846-2340 / Fx: 846-4367 http://www.elitesoft.com/web/hvacr/elite_ezdoe_info.html	Provides full screen, fill-in-the-blank data entry, dynamic error checking, context-sensitive help, mouse support, graphic reports, a 750-page user manual, and extensive weather data. Full implementation of DOE-2 on DOS-based 386 and higher computers. On-line help. Some weather files. Based on DOE-2.1E. Operating System: DOS	<u>Input:</u> Fill-in-the-blanks <u>Output:</u> Standard DOE reports plus some custom graphic reports <u>Support:</u> Unlimited phone support	\$1295 w/documentation Source code not available.
FTI/DOE2 (Scott Henderson) info @ finite-tech.com Finite Technologies Inc. 3763 Image Drive Anchorage, Alaska 99504 Ph: 907-333-8937, Fx: 333-4482 http://www.finite-tech.com/	Version 3.0 Release -- FTI/DOE is 100% compatible with LBNL version. Source code versions will compile with most F77-compliant compilers. On-line help: 344 weather files for the U.S. and Canada. Based on ESTSC DOE-2.1E. No demo, 30-day trial period Operating System: DOS, Windows (3.x, 95, NT) AIX, ULTRIX, VMS, Linux, NeXTStep,	<u>Input:</u> Version 2.x: text based Version 3.x: graphical <u>Output:</u> All standard DOE-2 reports Run time and status graphics <u>Support:</u> 90-days free; then cost is \$ 35 each email per incident \$ 55 per hour per incident \$125 per hour for engineering advice.	\$ 995.99 US w/documentation \$1066 Int'l w/documentation \$4999.99 Source code
PRC-DOE-2 (Paul Reeves) Paul.Reeves@DOE2.com Partnership for Resource Conservation 140 South 34 th Street Boulder, CO 80303 Ph: 303-499-8611, Fx: 554-1370	Text-based version of DOE-2 includes documentation. Extensive information on new features, including information on new system types, new commands, new options, etc., added to later versions of 2.1E. Operating System: DOS, Windows (95, NT)	<u>Input:</u> Standard text-based <u>Output:</u> <u>Support:</u> Unlimited support.	\$ 495 w/documentation Source code not available.

Commercial Versions of DOE-2 (continued)

Program Name	Description	Cost
VisualDOE 3.0 (Eric Kolderup) support@eley.com Charles Eley Associates 142 Minna Street San Francisco, CA 94105 Ph: 415-957-1977 Fx: 415-957-1381 http://www.eley.com/gdt/visualdoe/index.htm	Fast construction of building geometry using pre-defined blocks and/or drawing interface. Import zone shapes from CADD file (dxf format). Point-and-click to define zone properties and HVAC systems. Rotate-able 3-D image of model. Custom hourly outputs, customized graphs. On-line help. 400+ US weather files, 12+ for Canada, plus selected locations around the world. Operating System: DOS, Windows (3.1, 95, NT)	<div> <div>Input</div> <div>Graphical</div> </div> <div> <div>Output</div> <div>Graphical</div> </div> <div> <div>Support</div> <div>90 days free phone and email support.; thereafter \$195/hear</div> </div> Contact Eley Associates for cost of Version 3.0 (with documentation) Source code not available.

Pre- and Post Processors for DOE-2

Program Name	Description	Cost
DrawBDL Joe Huang & Associates 6720 Potrero Avenue El Cerrito, CA 94530 Ph/Fx: 510-236-9238	DrawBDL , Version 2.1, is a graphic debugging and drawing tool for DOE-2 building geometry . DrawBDL reads your BDL input and makes a rotate-able 3-D drawing of your building with walls, windows, and building shades shown in different colors for easy identification. Operating System: DOS, Windows (3.1, 95, 98, NT) [Works with 2.1E]	\$125.00 plus shipping
PRC-TOOLS (Paul Reeves) P R C 140 South 34 th Street Boulder, CO 80303 Ph: 303-499-8611 / Fx: 554-1370	PRC-Tools aid in extracting, analyzing, and formatting DOE-2 output . <i>PRC-Grab</i> automates the process of extracting any number of answers from DOE-2 standard output files. <i>PRC-Hour</i> and <i>PRC-Peak</i> format the hourly output and create Peak-Day and Average-Day load shapes for any number of periods and for any combination of hourly values. Operating System: Windows (95, 98, NT) [Works with 2.1E]	\$99.00
RIUSKA (Tuomas Laine) Olof Granlund Oy P O Box 59 Helsinki, FIN-00701 Finland (tuomas.laine@granlund.fi) Ph: +358 (9) 351031 / Fx: 35103421	With RIUSKA user can add building envelope materials, internal loads and HVAC-system into the created 3D-model of the building and perform thermal calculations. RIUSKA can be used for space simulations to dimension cooling or heating equipments, or for energy calculations of the whole building. Operating System: Windows (95, 98, NT) [Works with 2.1E]	Contact Tuomas Laine for pricing.
Visualize-IT (Matt Brost) RLW Analytics, Inc. mattb@rlw.com 1055 Broadway, Suite G Sonoma, CA 95476 Ph: 800-472-6716 Fx: 707-939-8823 www.rlw.com/visualize_it.html	Visualize-IT 2.0 is a Windows application designed to help you explore and summarize short-interval time series data, e.g., measurements taken once every 15 minutes over a period of weeks, months or years. Visualize-IT has been developed specifically for electric and gas load data measuring class profiles, market-segments, individual customer sites or specific end uses. Customized DOE2.1e hourly output importer. Visualize-IT is highly useful and informative for looking at DOE2 output and/or comparing to interval metered data. It is equally useful for other time series measurements such as weather, industrial process control, and water quality. Operating System: Windows 95, 98 and NT	\$500.00 per set Volume Discounts Available

Special Versions of DOE-2

Program Name	Description	Cost
CBIP cbip.nrcan.gc.ca/cbip.htm Office of Energy Efficiency Natural Resources Canada 580 Booth St., 18th Floor Ottawa ON K1A 0E4, CANADA	Natural Resources Canada's Commercial Building Incentive Program (CBIP) offers a financial incentive for the incorporation of energy efficiency features in new commercial and institutional building designs. The objective of this new incentive is to encourage energy-efficient design practices and to bring about lasting changes in the Canadian building design and construction industry. The program will be offered until March 31, 2004.	Web Based (free)
Cool Tools (Peter Turnbull) Pacific Gas & Electric Company pwt1@pge.com www.hvacexchange.com/cooltools/	The CoolTools™ project objective is to develop, disseminate and promote an integrated set of tools for design and operation of chilled water plants. CoolTools products are Internet based, public domain resources available to building owners, design professionals, and operators involved in both new construction and retrofits.	Web Based (free)
DesiCalc GRI-98/0127 www.desicalc.com	DesiCalc screens desiccant cooling applications. It estimates annual or monthly energy loads, using hour-by-hour simulations, and costs for 11 typical commercial buildings in 236 geographical locations in the US. Includes the latest TMY2 meteorological database [Based on DOE-2.1E] Operating System: Windows 3.1, 95, 98, NT	\$295 w/doc +8.75% tax in IL +4.5% tax in VA S/H add \$20
Energy Gauge USA (Danny Parker) Florida Solar Energy Center 1679 Clearlake Road Cocoa, FL 32922 energygauge.com	Energy Gauge USA allows the simple calculation and rating of residential building energy use in the US. The simulation calculates a six-zone model of the residence (conditioned zone, attic, crawlspace, basement, garage and sunspace) with the various buffered spaces linked to the interior as appropriate. TMY weather data for the program are available for 239 US locations. [Based on DOE-2.1E] Operating System: Windows 95, 98, NT	Contact Danny Parker at FSEC for availability.
Home Energy Saver (Residential DOE-2) hes.lbl.gov	Calculation of residential energy consumption using DOE-2.1E. The program performs a full annual simulation for a typical weather year (involving 8760 hourly calculations) from 239 locations around the United States in about 10-20 seconds.	Web Based (free)
PERFORM 2001 California Energy Commission 1516-9 th St., MS-13 Sacramento, CA 95814 Ph: 916-654-5385	Created for the State of California Energy Commission's, Title 24 energy code . Perform 2001 is an interface shell with DOE-2 as the engine. PERFORM 2001 calculates building energy consumption for space heating, space cooling and domestic hot water heating, and compares the energy consumption of the building design against the requirements of the standards. DOS input. Output is only California Title 24 compliant. [Based on DOE-2.1E] Technical support \$100/year from Gabel-Dodd Energy Soft LLC, Call 415-883-5900 for details.	\$250 including PERFORM 2001 program and manual on CD. (VISA/MC) Order #PS-400-04-017 www.energy.ca.gov/reports/reports_400.html
RESFEN-3.1 Building Technologies, MS 90-3111 Lawrence Berkeley Laboratory Berkeley, CA 94720	RESFEN calculates the energy and cost implications of a building's windows compared to insulated walls . The relative energy and cost impacts of two different windows can also be compared against each other. RESFEN calculates the heating and cooling energy use and associated costs, also the peak heating and cooling demand for specific window products. [Based on DOE-2.1E] Operating System: Windows 95, 98, NT	Free! Download from windows.lbl.gov/software/resfen

INTERNATIONAL DOE-2 RESOURCE CENTERS

The people listed here have agreed to be primary contacts for DOE-2 program users in their respective countries. Each resource center has the latest program documentation, all back issues of the User News, and recent LBNL reports pertaining to DOE-2. Users may make arrangements to photocopy the new material for a nominal cost. We hope to establish centers in other countries; please contact us if you want to establish a center in your area.

Australasia

P. C. Thomas, SOLARCH, University of New South Wales, Sydney 2052, Australia
Tel: +61 2 9385 6373 / Fax: +61 2 9385 6735, email PC.Thomas@unsw.EDU.AU www.fbe.unsw.edu.au/units/solarch

Australia

Murray Mason, ACADS BSG, 16 High Street, Glen Iris, VIC. 3146, Australia / Tel: +61 885 6586 / Fax: +61 885 5974

Brazil

Prof. Roberto Lamberts, Universidade Federal de Santa Catarina, Campus Universitario-Trindade, Cx. Postal 476, 88049-900 Florianopolis SC, BRASIL lamberts@ecv.ufsc.br
/ Tel: +55 48 331 9272/ Fax: +55 48 331 9770

Czech Republic

Ing. Zuzana Krtkova, Faculty of Civil Engineering, Dept. of Environmental and Building Services Engineering, Czech Technical University in Prague, Thakurova 7, 166 29 Praha 6, CZECH REPUBLIC krtkova@fsv.cvut.cz Tel: +42 2 2435 4327

Egypt

Dr. Ossama A. Abdou, Center for Building Environmental Studies and Testing (C-Best), 15-El-Shibani Street, Almanza, Cairo, Egypt Tel: +20 2 391 1137 or +20 2 417 4583 / Fax: +20 2 519 4343 / oabdou@hotmail.com

Germany

B. Barath or G. Morgenstern, Ingenieurbüro Barath & Wagner GmH, Postfach 20 21 41, D-41552 Kaarst, Germany
Tel: +49 2 131 7574 9012 G. Morgenstern / Fax: +49 2 131 7574 9029

Hong Kong, China, Taiwan, Japan

Dr. Sam C. M. HUI or K.P. Cheung, Dept of Architecture, University of Hong Kong, Pokfulam Road, Hong Kong (SAR), CHINA / cmhui@hku.hk or kpcheung@hku.hk / <http://arch.hku.hk/research/BEER/DOE-2/DOE-2.htm>
Tel: +852 2859 2123 Sam Hui / Fax: +852 2559 6484

India

Jiten Prajapati or Anil K. Anand, Energy Systems Engineering, IIT-Mumbai, Powai, Mumbai 400 076, INDIA
Tel : +91 022 578 2545 x7378

Italy

Marco Rapella, Via Bonfadini 33, I-23100 Sondrio, ITALY Tel: +390342511168, marco.rapella@libero.it, cell phone number: +393474756858

Korea (Chungnam)

Dr. Jun Tae Kim, Department of Architectural Engineering, Kongju National University, 182 Sinkwan-dong, Kongju, Chungnam 314-701, Republic of Korea / jtkim@knu.kongju.ac.kr / Tel: +82 416 850 8653 / Fax +82 416 856 9388

Korea (Seoul)

Dr. Jung-Ho Huh, Ph.D., Assistant Professor, Dongdaemoon-Gu Jeonnonng-Dong 90, Dept. of Architectural Engineering, The University of Seoul, Seoul 130-743, Korea. -- huhj0715@uoscc.uos.ac.kr, Tel: +02-2210-2616 / Fax: +02-2248-0382

INTERNATIONAL DOE-2 RESOURCE CENTERS (continued)

Korea (Taejon)

Dr. Euy-Joon Lee and Jong-Ho Yoon, Passive Solar Research Team, Bldg 2, Room 202, Korea Institute of Energy Research, Daeduk Science Town, 71-2 Jang-Dong, Yusong-Gu, Taejon 305-343, Republic of Korea. -- Lee: ejlee@kier.re.kr, Yoon: yesru@kier.re.kr
Tel: +82 42 860 3514 / Fax: +82 42 860 3132

New Zealand

Tan Yune, Architecture Department, The University of Auckland, Private Bag 92019, Auckland, New Zealand tanyune@ccu1.auckland.ac.nz / Tel: +64 9 373 7999 x5647 / Fax: +64 9 373 7410

Portugal, Spain, Italy, and Greece

Antonio Rego Teixeira, INETI, Departamento de Energias Renováveis (DER), Estrada do Paco do Lumiar, 1649-038 Lisboa, Portugal
rego.teixeira@mail.ineti.pt / Tel: +351 21 716 5141 x2669 / Fax: +351 21 716 4305

Singapore, Malaysia, Indonesia, Thailand, and the Philippines

WONG Yew Wah (Raymond), Nanyang Technological University, School of Mechanical and Production Engineering, Nanyang Avenue, Singapore 2263, Republic of Singapore, mywwong@ntu.edu.sg / Tel: +65 790 5543 / Fax: +65 791 1859

South Africa

Prof. L. J. Grobler, School of Mechanical and Materials Engineering, University of Potchefstroom, Private Bag X6001, Potchefstroom 2520, South Africa, mgiljg@puknet.puk.ac.za / Tel: +27 148 299 1328 / Fax: +27 148 299 1320

Switzerland

René Meldem, BG ingenieurs Conseils SA, 61 Avenue de Cour, Case postale, CH-1000 Lausanne, Switzerland
Tel: +41 21 618 1111, Fax: +41 21 618 1122, rene.meldem@bg-21.com

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INTERNATIONAL DOE-2 ENERGY CONSULTANTS

Australia

P. C. Thomas, Sustainable Building & Energy Consultants, 6/52 Houston Road, Kingsford NSW 2032, Australia.
Tel/Fax: +61 2 9662 0205, Mobile +61 417 405 478, pc_thomas@iname.com

Belgium

Andre Dewint, S.A. Alpha Pi n.v., Avenue Franklin Roosevelt 74 bte 2, B-1000 Bruxelles, BELGIUM, Tel: +32 2 343 4251 / Fax: +32 2 343 0377

Canada

Curt Hepting, P.Eng. EnerSys Analytics, 2989 Delahaye Drive, Coquitlam, B.C. V3B 6Y9 Canada chepting@telus.net / <http://www.enersys.ca/info/>
Tel: (604) 552-0700 / Fax (604) 552-0713

Dejan Radoicic, D. W. Thomson Consultants, Ltd., 1985 West Broadway #200, Vancouver, BC V6J 4Y3, Canada Tel (604) 731-4921 / Fax (604) 738-4420

Neil A. Caldwell, PE, DukeSolutions Canada, Inc., 1730 - 401 West Georgia St., Vancouver, BC V6B 5A1 Canada ncaldwe@duke-energy.ca

Dr. Stephane Bilodeau, PE, President, Groupe Enerstat, Inc., 79 Wellington North #202, Sherbrooke (Quebec) J1H 5A9, Canada
sbilodeau@groupeenerstat.com / Tel: (819) 562-8040 / Fax (819) 562-5578

Gordon Shymko, G.F. Shymko & Associates, Inc., 129 Evergreen Crescent S.W., Calgary, Alberta T2Y 3R2, Canada

Germany

Jens Grundt and Ludwig Michel, GMW-Ingenieurburo, Die Planer Villa, Bunteweg 10a, 30559 Hannover, Lower Saxony, Germany
Tel: +49 0511 58 59 48 -11/Fax +49 0511 58 59 48 -48 www.gmw-ingenieurbuero.de j.grundt@gmw-ingenieurbuero.de

Italy

Marco Rapella, Via Bonfadini 33, I-23100 Sondrio, ITALY Tel: +390342511168, marco.rapella@libero.it, cell phone number: +393474756858

Ireland

Paul Overy, Overy + Associates, Mechanical and Electrical Consulting Engineers, 43 Parnell Street, Clonmel, Co Tipperary, Ireland
Tel: +353 (0)52-27667, Fax: +353 (0)52-29238 www.overy-assoc.com

New Zealand

Paul Bannister, Energy Group, Ltd., 14a Wickliffe Street (P.O. Box 738), Dunedin New Zealand eglstaff@earthlight.co.nz, Tel: +64 3479 0148, Fax: 3479 0759

Switzerland

René Meldem, BG ingenieurs Conseils SA, 61 Avenue de Cour, Case postale, CH-1000 Lausanne, Switzerland
Tel: +41 21 618 1111, Fax: +41 21 618 1122, rene.meldem@bg-21.com

Philip Schluchter, Institut für Bauphysik Klein, Urs Graf-Strasse 1, CH-4052 Basel, Switzerland

Gerhard Zweifel, Hochschule Technik + Architektur Luzern, Technikumstrasse 21 Abt. HLK, CH-6048 Horw, Switzerland gzweifel@ztl.ch
Tel: +41 349 3349, Fax: 349 3960

Markus Koschenz, Building Equipment Section 175, EMPA, 129 Überlandstrasse, CH-8600 Dübendorf, Switzerland
Markus.Koschenz@empa.ch, Tel: +41 1823 5511, Fax: 821-6244

United Kingdom

Dr. Peter Simmonds, Ove Arup and Partners, Ltd., 13 Fitzroy Street, London W1P 6BQ, UNITED KINGDOM.
Tel: +44 20-7465-3637 / Fax: 7465-3667, peter.simmonds@arup.com / www.arup.com

U. S. DOE-2 ENERGY CONSULTANTS

Arizona				
Dale R. Broughton, P.E. drb6@home.com	Quantum Computer Resources www.qcr-usa.com	20833 North 1 st Street	Phoenix, AZ 85027	(623) 780-3496 fax: 322-0049
Henny van Lambalgen, P.E. henny@questenergy.com	Quest Energy Group, LLC www.questenergy.com	4324 East Pearce Road	Phoenix, AZ 85044	(480) 753-5590 fax 753-1215
Marlin S. Addison marlin.addison@doe2.com	M. S. Addison & Associates	1215 West 12th Place	Tempe, AZ 85281	(480) 968-2040 fax: 968-2053
Chuck Sherman ces@essinc.com	ESSengineering	2141 East Broadway, #211	Tempe, AZ 85282	(480) 784-4500 fax: 784-4800
Sarat Kanaka nexus@nexusenergy.com	EcoGroup, Inc., Suite 301	2085 E. Technology Circle	Tempe, AZ 85284	(602) 777-3000
California				
Joseph Deringer, jderinger@deringergroup.com Qiang (Peter) Zhang peter@deringergroup.com	The Deringer Group, Inc. www.deringergroup.com www.ecoadvisor.com	1349 Addison Street	Berkeley, CA 94703	(510) 843-9000 fax: 843-9005
M. Gabel, R. Howley office@gabelenergy.com	Gabel Associates, LLC www.gabelenergy.com	1818 Harmon Street	Berkeley, CA 94703	(510) 428-0803 fax: 428-0324
George Marton	1129 Keith Avenue		Berkeley, CA 94708	(510) 841-8083
John R. Aulbach, PE	jrascab36@earthlink.net	23508 Naffa Avenue	Carson, CA 90745	(310) 549-7118
Leo Rainer lirainer@davisenergy.com	Davis Energy Group, Inc. www.davisenergy.com	123 C Street	Davis, CA 95616	(916) 753-1100
L. Heshong and D. Mahone lheshong@h-m-g.com dmahone@h-m-g.com	The Heshong Mahone Group www.h-m-g.com	11626 Fair Oaks Blvd, #302	Fair Oaks, CA 95628	(916) 962-7001 fax: 962-0101
Cliff Gustafson	Taylor Systems Engineering, Inc. www.tse-inc.net	9801 Fair Oaks Blvd., #100	Fair Oaks, CA 95628	(916) 961-3400 fax: 961-3410
Tom Lunneberg, PE info@ctg-net.com	Constructive Tech. Group www.ctg-net.com/main.htm	16 Technology Dr., #109	Irvine, CA 92618	(714) 790-0010
David J. Schwed rma@as.net	Romero Management Associates www.asnet/~rma/index.htm	1805 West Avenue K	Lancaster, CA 93534	(805) 940-0540
Martyn C. Dodd support@energysoft.com	Gabel Dodd/EnergySoft, LLC www.energysoft.com	100 Galli Drive, # 1	Novato, CA 94949	(415) 883-5900 fax: 883-5970
Jim Kelsey PE, Kevin Warren kelsey@kw-engineering.com	kW Engineering www.kw-engineering.com	360-17 th Street #100	Oakland, CA 94612	(510) 834-6420 fax: 834-6373
Patrick Nkwocha, PE UPat@worldnet.att.net	Global Tech Services	3360 Foothill Blvd., #108	Pasadena, CA 91107	(626) 583-8205 fax: 583-8206
James Trowbridge, PE	Trowbridge Engineering	8240 Caribbean Way	Sacramento, CA 95826	(916) 381-4753
Greg Cunningham gwc@essinc.com	ESSengineering	114 Sansome St., #1201	San Francisco, CA 94104	(415) 296-9760 fax: 784-9761
Charles Eley, T. Tathagat info@eley.com	Eley Associates www.eley.com	142 Minna Street	San Francisco, CA 94105	(415) 957-1977 fax: 957-1381

U. S. DOE-2 ENERGY CONSULTANTS (continued)

California (continued)				
John F. Kennedy, PE info@geopraxis.com	GeoPraxis, Inc. www.geopraxis.com	205 Keller Street	Petaluma, CA 94952-3874	(707) 766-7010 fax: 766-7014
Chandra Shinde, PE	Envirodesign Group	19613 El Camino Esplanade	Walnut, CA 91789-2138	(909) 598-1980
Colorado				
Fred Porter	Architectural Energy Corp	2540 Frontier Ave, #201	Boulder, CO 80301	(303) 444-4149 fax: 444-4304
Dr. Ellen Franconi ellenf@schiller.com	Schiller Associates www.schiller.com	1401 Walnut Street, #403	Boulder, CO 80302	(303) 440-4343 fax: 440-6644
Paul Reeves	PRC	140 South 34 th Street	Boulder, CO 80303	(303) 499-8611
Susan Reilly denver@enermodal.com	Enermodal Engineering	1554 Emerson Street	Denver, CO 80218	(303) 861-2070 fax: 830-2016
Colorado				
Charles Fountain	Burns & McDonnell www.burnsmcd.com	8055 E. Tufts Avenue, #330	Denver, CO 80230	(303) 721-9292
Joel Neymark, PE neymarkj@qwest.net	J. Neymark & Associates	2140 Ellis Street	Golden, CO 80401	(303) 384-3672 fax: 384 9427
Norm Weaver, PE n_weaver@interwvr.com	Interweaver Consulting www.interwvr.com	P.O. Box 775444	Steamboat Springs, CO 80477	(970) 870-1710
Connecticut				
Adrian Tuluca swa@swinter.com	Steven Winter Associates www.swinter.com	50 Washington Street	Norwalk, CT 06854	(203) 857-0200 fax: 852-0741
District of Columbia				
Kurmit Rockwell, PE	XENERGY, Inc., Suite 1110 www.xenergy.com	1025 Connecticut Ave., N.W.	Washington, DC 20036	(202) 872-1626
Florida				
Philip Wemhoff wemhoff@netzero.net	9765 MacArthur Court North		Jacksonville, FL 32246	(904) 645-5342
Dr. Paul Hutchins PE,CEM	Reynolds Smith & Hills, Inc. www.rsandh.com	4651 Salisbury Road	Jacksonville, FL 32256	(904) 279-2277 fax: 279-2491
Georgia				
Lung-Sing Wong, PE ls Wong@bpe-inc.com	Building Performance Engineers www.bpe-inc.com	3060 Wanda Woods Drive	Atlanta, GA 30340	(770) 270-0100
Glenn L. Bellamy gbellamy@heery.com	Heery International, Inc. www.heery.com	999 Peachtree St., N.E.	Atlanta, GA 30367-5401	(404) 946-2208 fax: 875-1283
Illinois				
Gary H. Michaels, PE	G.H. Michaels Associates	1512 Crain Street	Evanston, IL 60202	(847) 869-5859
Prem N. Mehrotra	General Energy Corp.	230 Madison Street	Oak Park, IL 60302	(708) 386-6000

U. S. DOE-2 ENERGY CONSULTANTS (continued)

Illinois (continued)				
Robert Henninger, PE rhenninger@gard.com	GARD Analytics, Inc. www.gard.com	1028 Busse Highway	Park Ridge, IL 60068-1802	(847) 698-5686
Kansas				
Dr. Brian A. Rock, PE barock@ukans.edu	A/E Dept, Marvin Hall	University of Kansas	Lawrence, KS 66045-2222	(785) 864-3603
Massachusetts				
C. Kalasinsky PE, T.Chan	R.G. Vanderweil Engrs., Inc. www.vanderweil.com	274 Summer Street	Boston, MA 02458-1113	(617) 423-7423 fax: 423-7401
Mark Mullins mmullins@hecenergy.com	HEC Energy & Design Services www.hecenergy.com	24 Prime Parkway	Natick, MA 01760	(508) 653-0456 fax: 653-0266
Michael Andelman andelman@jrma-ae.com	JRMA & Associates www.jrma-ae.com	421 Watertown St.	Newton, MA 02210	(617) 964-8889 fax: 964-7881
Missouri				
Mike Roberts	Roberts Engineering Co.	11946 Pennsylvania	Kansas City, MO 64145	(816) 942-8121
Bruce A. Leavitt, PE	Wm. Tao & Associates Inc.	2357-59 th Street	St. Louis, MO 63110	(314) 644-1400
Montana				
Michael W Harrison, PE	Harrison Engineering	139 Bluebird Lane	Whitehall, Montana 59759	(406) 287-5370
Nebraska				
Philip M. Schreier, PE FEI-OMA@worldnet.att.net	Farris Engineering www.nebraska.org/4/4/01/00/co.htm	11239 Chicago Circle	Omaha, NE 68154-2634	(402) 330-5900 fax: 330-5902
New York				
Robert E. Gibeault gibeault@pbworld.com	PB Power, Inc. www.pbworld.com	1873 Western Avenue #201	Albany, NY 12203	(518) 862-0012 fax: 862-1608
J. Fireovid, K. Yousef	SAIC Energy Solutions Div. www.saic.com	1 Marcus Boulevard	Albany, NY 12205	(518) 458-2249
Dave Pruitt, Scott Frank	Jaros, Baum & Bolles www.jbb.com	80 Pine Street	New York, NY 10005	(212) 530-9300
H. Henderson henderson@cdhenergy.com S. Carlson carlson@cdhenergy.com	CDH Energy Corporation www.cdhenergy.com	P.O. Box 641 (132 Albany Street)	Cazenovia, NY 13035	(315) 655-1063 or (315) 655-1058
North Carolina				
Gopal Shiddapur, PE gsshidda@duke-energy.com	DukeSolutions (MC: ST05A) duke-energy.com	230 S. Tryon Street, # 400	Charlotte, NC 28202	(704) 373-4439 fax: 373-4872
Hank Jackson, PE hzjackson@juno.com	R, C, & I Engineering Services Inc.	P.O. Box 675	Weaverville, NC 28787-0675	(704) 691-0785 fax: 658-0474

Please visit our web site at <http://SimulationResearch.lbl.gov>

U. S. DOE-2 ENERGY CONSULTANTS (continued)

Oregon

Carol Gardner gems@teleport.com	Gardner Energy Management Services	PO Box 12549	Portland, OR 97212-0549	(503) 223-4847 fax: 223-8486
John P. Karasaki, P.E. john_karasaki@pgn.com	Portland General Electric	121 SW Salmon Street MC: 1WTC0706	Portland, OR 97204	(503) 464-7803 fax: 464-2485

Pennsylvania

Kimberly Byk wba@utcorp.com	WB&A, Inc.	829 Meadowview Road	Kennett Square, PA 19348	(610) 347-0710 fax: 347-0711
--	------------	---------------------	--------------------------	---------------------------------

Texas

Jeff S. Haberl jhaberl@esl.tamu.edu	Energy Systems Laboratory esl.tamu.edu	Texas A&M University	College Station., TX 77843-3123	(409) 845-6065
---	---	----------------------	------------------------------------	----------------

Virginia

Dave Walker walkeng@swva.net	Walker Engineering www.swva.net/walkeng	P.O. Box 366	Staffordsville, VA 24167	(540) 921-4544 fax: 921-4548
--	--	--------------	--------------------------	---------------------------------

Washington

Steve Byrne byrne@item.com	ITEM Systems, suite 344 www.halcyon.com/byrne/item.htm	321 High School Road NE	Bainbridge Island, WA 98110	(206) 855-9540
Gregory J. Banken, PE gbanken@qmetrics.com	Q-Metrics, Inc. www.qmetrics.com	P.O. Box 3016	Woodinville, WA 98072-3016	(425) 825-0200 fax: 825-0136